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WATER USES AND WATER QUALITY INTERFERENCES WITH WATER USES. SNAKE RIVER BASIN

Federal Water Pollution Control Administration
Portland, Oregon

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COLUMBIA RIVER BASIN PROJECT

FOR WATER SUPPLY AND WATER QUALITY MANAGEMENT

WATER USES AND WATER QUALITY INTERFERENCES WITH WATER USES SNAKE RIVER BASIN

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This working paper contains preliminary data and information primarily intended for internal use by the Columbia River Basin staff and cooperating agencies. The material presented in this paper has not been fully evaluated and should not be considered as final.

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WATER USES AND WATER QUALITY INTERFERENCES WITH WATER USES SNAKE RIVER BASIN

I. INTRODUCTION

No river system on the North American Continent has had greater multi-purpose potential and yet has been put to such single-purpose use as the Snake River.

The Missouri River has long been known as the "Big Muddy." The Colorado--nicknamed the "Great Red River" by the early Spaniards--has long been known to be "too thin to plow and too thick to drink." The Columbia is sterile, and the Sacramento isn't much better. As rivers go, the San Joaquin and Platte are relatively little boys in big pants. In all the West the Snake River stands out for its capacity for compatible multiple use--and presently it can't pass a Wasserman.

The Snake River is included in the Columbia River Basin. This major tributary to the Columbia River originates above Jackson Lake in the Grand Teton National Park in the State of Wyoming and flows in a meandering arc east to west across the State of Idaho. Turning northward, it forms the boundary between the States of Idaho and Oregon.

In the Pacific Northwest, the Snake River--especially since the construction of Grand Coulee Dam--is second to none in fisheries production and is second only to the Columbia River for production of hydropower and as a source of water for irrigation. Another important use of the river is the assimilation and transport of industrial,

commercial, municipal, domestic and agricultural wastes. Present information regarding other uses and their magnitude is extremely limited. This study was conducted to correct this situation.

II. STUDY

This natural resource use study was conducted in conjunction with a water quality investigation from August 22-28, 1966. The primary objective was to determine non-documented major water uses--at pre-selected locations--and to grossly assess the suitability of the water environment to serve such uses. In general, terms such as "high" (aesthetic value), "heavy" (fisherman use), "moderate," "light," "nil" or "non-existent," are used to delineate the degree of intensity of a use or of its quality. These uses and assessments are not to be compared across the board. For example, waterfowl use designated as "heavy" on a small tributary stream and "moderate" on the Snake River in a certain section does not mean that there will be more hunters or waterfowl in numbers or kinds on the tributary than there will be on the Snake River. Potential use and/or carrying capacity in situ were considered to be the key to evaluation; and each situation was judged and assessed upon its own merits and capacity. In general, no comparisons should be made between stations per se except to note whether a decline, improvement, or whatever other changes--categorically--took place between stations.

In general terms, it is often convenient to define a fishery type as coldwater, warmwater, coarse, or trash. A coldwater type has the connotation of trout or salmon; a warmwater type denotes spiny-rays;

and coarse or trash are plastic, flexible words with far too many meanings. Such designations are fish management garbage. Trash-fish can and do live in cold as well as warmwater. These trash or coarse fishes are so designated upon certain arbitrarily assumed desirable or undesirable characteristics that include what they look like, how they are built, what they feed upon, how easy they are to catch, their flavor, and how easy they are to prepare, cook, and eat. In this regard fish management laws have oftentimes been most discriminating.

Again, the effect of temperature and/or its variation is not generally known or understood. As a case in point, the optimum spawning temperature range for trout and salmon is--let's say--45 to 58° F; large and small mouth bass--let's say--65-70° F; channel catfish--70-75° F. and panfish 70-78° F. The optimum growing temperature range for trout and salmon is 65-68°, and the optimum ranges for the other species overlaps this to a significant extent. A person in the habit of thinking would naturally wonder "when or how do you draw the line?" It's rather simple. Just include other information such as hydraulics, food supplies, etc., in the assessment. The naked fact is that Nature will produce fish--and will continue to do so--in prodigious quantities. It is our choice to determine what species. Only man is interested in what kinds. Nature's only apparent interest is in producing the tonnage.

III. METHODS

The typical situation was first determined by gross visual observation ot each station. Several representative places were then selected and examined by visual observation in greater detail. Pertinent information was recorded by station in the field, and photographs were frequently taken for future reference.

IV. RESULTS

Comments and observations by stations are as follows:

Snake River, Henrys (North) Fork above St. Anthony
(S837.4 HF34.9)

In this section, the stream supports a good well balanced salmonid (non-migratory) fishery. In fact, the trout fishery is outstanding. Species include rainbow, kokanee, whitefish seasonally, brooktrout and cutthroat. The sizes, quality, and use of the gravel beds for spawning purposes are of sufficient magnitude to adequately maintain the fishery at its present level. The typical number and type of warm-water or coarse fishes was nil. Free growing pondweed, water weed, carrots and parsley, etc., and/or water milfoil masses from upstream which were caught on some of the boulders or were drifting in eddies, as well as in the streambed itself, supported good populations of three kinds of snails, as well as a large and greatly diversified aquatic insect population. Some encrusting algae was noted on all the rocks.

In this stretch of the river the aesthetic value of the stream is extremely high. The general color of the river was emerald; and the water was colorless. The stable bottom was covered with encrusting

growths of green algae and diatoms (yellow-brown algae). Light fishing and other uses from bankside were noted. Uses for other water-contact and boating sports were nil. Waterfowl in season use will be light, but upland and small game bankside use was heavy.

A major (about 10 percent) irrigation diversion was noted on the right bank at about River Mile HF 35.0. In general, with the exception of no fish screen, this diversion does not cause any adverse effect to the other uses of the stream. However, a major adverse effect to the stream at River Mile HF 33.02 was noted from an unscreened diversion dam at this point. Below this diversion (River Mile HF 33.02 at the southwest edge of St. Anthony, Idaho) the North Fork isn't much more than a trickle. The evidence indicated the streambed had been essentially dry for some period of time. In this condition, stock watering is the only possible use it would have until irrigation water had been returned to the natural stream.

Snake River near Lorenzo, Idaho
(S845)

This reach of the Snake River also supports an excellent, well-balanced salmonid (non-migratory) fishery, including rainbow, cutthroat, brook and brown trout and whitefish. Gravel beds are of sufficient size and quality to maintain the fishery at its presently high level. Warmwater and coarse fish populations were nil. The bulk of the aquatic vegetation in the stream is planktonic and there was very little unicellular algae on the rocks. Note, this is different than the situation observed in the Henrys Fork. Major fish food production is in eddies and side channels, not in the main stream. A good, diversified aquatic

insect population was observed in the eddies and side channels. It isn't surprising, then, that many large schools of trout fry and fingerling and other fishes were also observed.

Compared to the situation noted in the Henrys Fork, masses of free aquatic vegetation were conspicuous by their absence.

The aesthetic value of this section of the river is also extremely high. The general color of the stream in this reach was a pastel light-bluish green. Unlike water of the Henrys Fork, which was colorless, the water in the Snake at Lorenzo was slightly milky (which explains the pastel appearance). The water was not, however, turbid, as evidenced by the fact that the bottom could be easily seen at about an eight-feet depth (and probably deeper, if such a situation had been found). The surfaces of the exposed rocks--not boulders--in the main channels were as clean as if sand blasted--which, in essence, they were, by bed load sand.

Bankside use such as fishing, picnicking, and simple strolling was light. Use for boating and swimming was nil. Waterfowl use in season will be nil also; but upland and small game bankside use was heavy. Bankside use by big game should be considered "moderate," as evidenced by tracks and other signs.

(For what it's worth: Water which had been stored in Palisades was being passed through the system to Milner. The milky appearance of the water had the characteristics of either glacial melt or the very fine soil loam found in the watershed. The chances are this milky color condition was caused by colloids resuspended and flushed from Palisades. There wasn't enough to effectively reduce transparency to any degree at the time of observation, but there could have been enough to cloud the river at a later date.

Teton River, North Fork, Sugar City
(S837.4 HF20.4 T11.7 - 12.0)

This reach of the Teton River system supports a good, balanced population of native varieties of many coarse fishes (chubs, suckers, minnows and daces). Only two small trout were observed. Spawning areas for more desirable species of fishes were destroyed by silt and blue-green algae. Bankside evidence shows streamflow is highly irregular, intermittent, and essentially uncontrolled. During many periods the bedload would be composed of large amounts of sand and mud. The bottoms of riffle areas were stabilized with rock and gravel; which, in turn, were covered with pennate diatoms. The remainder of the bottom was covered with a combination of gravel, sand, and silt. Beds of waterweeds, pondweed, and water milfoil were very much in evidence. In the riffle areas, forms of caddisflies, stoneflies, and mayflies, and one type of snail were observed. In all areas an abundance of strainer types of insect larvae were found (evidence of organic suspended matter). In addition, dragonfly larvae were discovered in the Micro-pond sections (eddys) prowling in search of prey among the submerged vegetation.

With the exception of local "Huck Finns," the aesthetic value of this reach of the stream is nil. (This is not to say that its use by adventuresome boys is to be ignored. This may well be its highest order of utility.) Other recreational uses (boating, picnicking, etc.) are non-existent. The major single purpose use is irrigation by pump. Waterfowl use (ducks and coots) is heavy for the size of the stream, as is the bankside use by upland and small game; but this is accidental. Use by big game was also largely accidental.

In summary, the above situation is what should be expected. In the above instance we have observed and sampled a small, relatively non-descript stream flowing through a single-purpose, well-regimented community. Need we say more?

Teton River, South Fork, Rexburg
(S837.4 HF 11.1 T8.5)

This stream supports a good population of creek chub and varieties of other small species of coarse fishes such as native minnows and daces. No trout were observed or raised, whitefish being the most important sport fish. In this reach the streambed is comprised of a series of riffles, bars, pockets, and pools. The streambed in riffle areas was covered by rock, gravel or gravel and clay. Bar areas were composed of gravel and clay. The bottoms of pools and pockets were covered with soil-type sludge. In the pools and pockets with good hydraulic circulation, pondweeds, milfoil, and filamentous green algae beds were noted in association with various typical insect larvae and small fish species. Large schools of creek chub were noted. There were many snails per rock on those rocks not covered by a slick film of soil. Very little green algae or diatom growth was noted in riffle and bar areas. Encrusting algae was observed growing on the slick mud surfaces between the rocks. Fly larvae of the strainer-type were the most common form of insects.

With the exception of re-use by local children, this stream has no aesthetic value. Garbage has been freely dumped into it; and the remains of a cow were noted in the stream. The color of the water was clear, even though the general appearance of the stream was slightly milky.

Bankside recreational use is nil. The use of pockets and pools by waterfowl in season would be heavy. Upland and small game use varies from moderate to heavy, depending upon the type and degree of cover. No use by big game was noted. Two pumps for irrigation were observed. Barnyard drainage into the river was seen at one location. The flow of this stream must be uncontrolled, and varies seasonally by several orders of magnitude. Its present major uses are irrigation and stock watering. The potential of this stream for other water oriented uses is zero. Over-grazed pastures used for garbage dumps and/or beet or corn fields just do not lend themselves to highly developed, intensely used recreational areas. Moreover, the human population is too sparse to justify any recreational development on this "creek."

Snake River, Henrys (North) Fork Above the Mouth
(S840 HF 9-10)

The Henrys Fork in this section supports a very limited, intermittent but well- balanced non-migratory salmonid fishery and white fish in season. The sizes, quality, and use of gravel beds for spawning purposes are adequate to maintain the fishery at its present low level. Stream volume fluctuation is the major limiting factor. Rock, gravel, and/or sand cover most of the bottom. Sand and mud cover the bottom in eddies and protected areas, with the mud layer usually on top. Since the bottom and banks were covered by rock, gravel and/or sand, it is probable that the silt was carried into the stream by irrigation return water. The streambed was stabilized and on and around the rocks a good, diverse insect population was found, with one species of snail in association with limited but adequate encrusting green algae and diatom growth. Emergent duckweed was the prevalent plant in eddies, but pondweed and waterweed were also noted.

In this reach the stream is reasonably confined in its upper part and meanders with many side channels in the lower part. Aesthetic attraction is high. The general color of the river was a dark, slightly olive, brown-green; and the water was colorless. Light fisherman use was noted, with other bankside uses being nil. Uses for other water-contact and boating sports is non-existent. Use by waterfowl will be moderate; but bankside use by upland and small game was heavy. Bankside use by big game was very light. In summary, as long as the single purpose use of the stream for irrigation prevails, all of the other possible uses which are in conflict with this use will be either very light or non-existent.

Snake River Above Idaho Falls
(S804.7 - S820)

This highly controlled reach of the Snake River supports a healthy natural cold-water game fishery of moderate quality. Rainbow and cutthroat trout, with whitefish in season, are the major game fish species. Coarse fish species in far greater numbers and kinds include chubs, suckers, perch, squawfish, minnows and daces. Most of the bank area is well stabilized by either riprap, emergent aquatics (cattail, bulbrush, etc.) or trees (willow, cottonwood, etc.). The game fish population is not limited by either lack of spawning gravel or food; it is, however, limited and curtailed by mismanagement of the streamflow. Extensive beds of submerged (waterweed, coontail, and pondweed) and emergent (arrowleaf and duckweed) aquatics in eddies and alongside the Main Channel were very much in evidence. These luxuriant growths were

noted to occur in areas where prodigious quantities of mud, or sand and mud, had been deposited. These sediments had the characteristics of the local topsoil. In general, all types and kinds of aquatic life were in good supply.

Fisherman use, either from bankside or by boat, was slight. Other recreational use was nil. Waterfowl (mostly ducks) will be moderate and the use by upland and small game was moderate. Big game use was very light. This general area is good for bird watchers.

The aesthetic value of this section is high. The general color of the stream was a dark, slightly sandy, olive green. The color of the water was a very light, milky tan. The water is usually clear in this reach; however, the scouring effect of water being passed from Palisades to Minidoka resuspended a large quantity of silt. In addition, tremendous quantities of rooted, submerged aquatics were torn loose by the surging action of the water. The amount of plant material thus uprocted was so large it created a special problem of considerable magnitude at the powerhouses, where it was necessary for employees to continually clean trash racks, while normal cleaning frequently is once or twice a week. A major unscreened irrigation diversion was noted at the lower end of this section, but it was not being used at this time.

Snake River Near Shelley
(S790 - S793)

This unscreened section of the Snake River supports a moderate bankside trout fishery. The quality and sizes of the gravel beds are sufficient to support spawning and fish food production for a fishery of greater magnitude and quality than presently exists. The stable

bottom is covered mostly with rock and gravel. The eddies and channel side areas held the typical coarse fish types and kinds--such as chubs, suckers, daces, and minnows--as well as perch, in moderate mumbers. The ratio of trout of all sizes to the other fishes was estimated to be about 1:100. Small masses of pondweed, with some waterweed and flocs of filamentous green algae, were noted drifting downstream in the main channel, indicating that upstream trash racks above were not collecting all flotsam. Several species of duckweed, and filamentous and unicellular algae were observed growing in all eddies and side areas. Unicellular green algae clumps with entrained gas were noted floating "lilly pad like" in side areas. This condition and the accompanying type of snail shows the bottom in this situation to be very enriched organically.

The aesthetic value of this reach is still high. The general color of the river was a light olive green-brown, indicating a good diatom population. The color of the water was a very light milky ochre. With the exception of bankside fishermen and fishing from a boat, other water-contact use was nil. The use of this reach by ducks will be moderate, but the use by upland and small game is heavy. Use by big game is negligible.

A major unscreened diversion and rock weir were noted at about S791. Although it was not in use during the survey, evidence showed that it had been heavily used shortly before. Several Rainey wells for stock watering and pasturage irrigation were observed. Coarse fish

populations are enhanced by the provisions of spawning beds in the muddy sand side areas somewhere above the weir. Nothing from these areas enhances a salmonid population. In fact, when competition between juveniles is considered, enhancement of the coarse fish population would have a negative effect upon the trout population.

Blackfoot River Near Mouth
(S751.2 BF .1 to BF5.0)

This reach of the Blackfoot supports a good, well-diversified population of small varieties of coarse fish, but rainbow and cutthroat trout are present. Compared to the flow at the southwest corner of the town of Blackfoot, streamflow at the mouth is reduced to a trickle. The upper reaches of the stream support an outstanding trout fishery. During the survey, water for irrigation "down the valley" was removed by either direct pump or syphon. This highly controlled and levied stream was observed in back of the filling station at the edge of town, to the left at the slaughter house, to the left at the Mormon Church, downstream by the Val Lee Dairy Bridge, and in the swampy area of approximately BF 2.1. Water removal was especially noticeable between the Mormon Church turnoff and the Val Lee Dairy, a road distance of about 3 miles. The primary use was for green pasturage at this time.

This stream below the town of Blackfoot has been so drastically changed from its natural state that it resembles the drainage ditch which--in addition to the re-use of its water--it is. It is not suggested that the stream would have the comparable uses and high capacity for

production of either the Sandy, Willowa, or even the Klickitat Rivers. The soil is too light, agricultural practices poor, flow insufficient, and water demands too great to harbor such notion. But the Blackfoot River has much higher potential than is presently realized.

This reach of the stream in general has a very alluvial bottom. Occasionally a few rocks can be observed. In the channel, prodigious quantities of submerged aquatics such as pondweed, waterweed, and filamentous algae can be observed. When possible, the muddy bottom also supports a good diatom (pennates) population. Diptera larvae were found associated with the silt, and dragon fly and damsel fly nymphs were found in association with both the pondweed and green algae masses. Other insect types and kinds in reduced numbers were found, but this stream during this survey had the general characteristics of a moderately organically enriched pond.

The Val Lee Dairy is established on the river bank at about 3F2. This is the location of the first road bridge above the mouth (BF.1). Bankside and in-stream evidence show this dairy discharges a large proportion of its waste directly to the stream. A good gravel outcropping was noted in this area, but very few aquatic organisms could be found. The few that were found were the highly resistant, micro-strainer type.

The aesthetic value of this reach of the stream is very low and with the exception of high waterfowl and upland and small game use, non-agricultural uses are nil.

Snake River, Tilden Bridge
(S745-S752)

This section of the Snake River supports a high quality rainbow and cutthroat trout fishery in season. Most of the bottom is covered by rock and/or gravel. The gravel beds are of sufficient size and quality to maintain the excellent trout fishery. The typical numbers and types of coarse fishes are moderate in the stream, but large numbers of coarse fishes (including perch and crappie) inhabit the lower stretch and American Falls Reservoir.

Green algae and diatoms are the dominant plants in the stream; but in shallows the dirt and/or sand bars support good stands of submerged and emergent aquatics. Duckweed, pondweed, and waterweed are the dominant kinds. In addition to the snails observed, rising fish and thousands of swallows feeding over the water give evidence of an excellent aquatic insect population.

The aesthetic value of the stream is high. The current is fast, but the water is not too roilled. Bankside fisherman use is moderate, and fisherman use by boat is also moderate. The general color of the river was an olive green brown. The water was slightly milky. Waterfowl use in season will be heavy for ducks and moderate for geese. Upland and small game use was heavy, but big game use was light. Other water contact uses such as waterskiing, boating, etc., (but not picnicking) was moderate. Irrigation use by pump and rainey well was moderate. Spray irrigation was the method most often employed.

Portneuf River Above Inkom
Above Confluence with Marsh Creek
(S736 P 22-43)

This reach of this small, meandering, drastically controlled stream has an excellent trout (rainbow and cutthroat) population in the upper portion, and a moderate trout population in the lower portion. There was a relatively heavy population of coarse fish--mostly minnows, daces and creek chub, but some carp and suckers, in pools. This stream's lower reaches are a series of short riffles and long runs and pools. The riffles are from gravel and rock outcropping, and the runs have gravel or sandbar outcropping; otherwise it has a soft to mud-clay covered bottom. Moderate growths of pondweeds were noted in pools, and duckweed was most prevalent along the bank and shoal area. The usual assortment of aquatic insects was not found. Reduced numbers of both kinds and population show that the stream in this reach is not too productive. Most of the insects observed were heat-resistant, micro-strainer types which strain suspended organic particulate matter from the water. A reduced population of algae and diatoms was also observed.

The river in this stretch has only a moderate aesthetic value. During these observations the water was clear, but evidence (very muddy bottom) shows it could get highly turbid in short order. Waterfowl and big game use is light; however, big game hunting above the reservoir is always moderate. Small and upland game use is moderate. With the exception of one State park which may be considered a beneficial aesthetic use, the major uses of this stream are for stockwatering and for spray irrigation. Frankly, by the looks of some of the "Peter Tumbledown Farm" and the skin and bone nags and cows--it's a shame to waste the water.

Marsh Creek

The right hand tributary of the Portneuf River flows north to join the Portneuf River less than a mile above the village of Inkom, Idaho.

Briefly, this very meandering, highly controlled, and turbid, shallow stream is about three quarters filled with pondweed. The general color of the stream is a grey olive green. The color of the water is the same as the general soil color--whitish grey. The estimated summer flow of Marsh Creek is about three times that of the Portneuf at their confluence. The major use is for irrigation. Some farmers had ditches and some use sprayers. All of the sprayers had pumps; but not all of the ditch farmers had to pump. Direct stockwatering was moderate. Upland and small game use was heavy. Big game use was light and sport fish (trout) and other water-contact uses is non-existent. (Two reservoirs, which are drained annually, provide the only fishable water.)

In addition to the agricultural uses, the best use of this stream--turbid or otherwise--is for increasing the flow of the Portneuf. That is, if the submerged aquatics, with the junk and garbage the stream has received, do not drastically reduce its flow. In addition, floating lily pads of unicellular algae were moderate to heavy, depending on the hydrology and geomorphology of the particular site. These lily pads are evidence of bottom enrichment by a thin layer of organic settleable solids.

Portneuf River Below Pocatello
(S736 P 10-11.7)

In the upper portion of this reach the stream is a highly turbid creek, perhaps two feet deep in summer. In this portion coarse fish such as carp and suckers were found in moderate numbers. No self-respecting game fish would be caught dead in the place, although a few

may pass through as tourists. The general color of the stream was milky light grey. There were a moderate number of gravel and small rock outcroppings in the stream bed, but the interstices were filled with a very fine textured silt. Solids from intermittent industrial wastes had built up a thin, grey, brittle, gypsum, egg-shell type coating on the exposed surface of rocks. In the stream area immediately exposed to Simplot's lower outfall, the rocks did not have this thin grey plating. This suggests a dissolving or corrosive capacity in the effluent.

Many springs and sources of irrigation return water were noted in this reach. Midge larvae, green algae and a few snails were observed growing only in areas fed by the springs or returned irrigation water. Dead snails, clams, suckers, and carp were found in the upper portion of this reach. In addition, a dead rabbit and two quail (uneaten) were found on two of the gravel bars, suggesting that some toxicity in the water rather than predators caused death. (It was too early in the year for death to be due to age.)

Conditions are somewhat changed in the lower reach of this section. The stream here is about ten times as big as it was above, due to spring inflows. The bottom was covered with rocks which were coated with silt. Diatoms were noted growing on this surface. Pond and waterweeds, in association with the more tolerant forms of insects (dragon flies, damsel flies, etc.), were noted growing throughout this section, where depth and/or light penetration permitted. The general color of the river was a milky, tan-brown but the water was a light, milky rust color. A

rowboat with a fouled bottom was noted tied up in front of one of the bankside residences. Considering all of the aquatic weeds in this section, waterfowl use might be moderate. Game fish (rainbow and cutthroat trout, crappie, perch and bullhead) use was light, limited, and intermittent. Coarse fish (all kinds and types) use was moderate; and there was no use by big game. Considering that much of the lowland area is swampy or cultivated, use by small and upland game animals would probably be light. This area has no positive aesthetic value.

American Falls Reservoir
(S715 - S745)

This largest (1.7 million acre-feet) unscreened impoundment of the upper Snake has an extremely high aesthetic value when it is full and clear; and a very low--depressing even negative--aesthetic value when it is either supporting a tremendous algae bloom or is highly turbid after maximum drawdown (empty). The major single purpose use of this reach is for downstream irrigation; however, efficient use--by programming--is made of this passed water for power production. Apparently, whenever possible, compatible power and irrigation water schedules are formulated. The second most important use is for the assimilation and/or transport of various wastes. These wastes vary in character from chemical processes to irrigation return water.

During spring months, essentially all uses are compatible and the quality high. As the reservoir is drained and the shoreline and bottom become bare, the reservoir now produces a tremendous crop of planktonic, obnoxious algae which possibly is only used by ducks. As soon as drawdown

is complete, passed-through water stirs the very light bottom sediments into suspension and causes the river to be highly turbid and colored for a considerable distance downstream--at least to Milner. Under these conditions fish food production, sport fishing success, aesthetics water-contact sports and most other uses are nil. (It may well be pointed out "swimmers itch" is most often associated with ducks and algae blooms.) Conditions enhance coarse fish population and, to date, sport fish (brown, cutthroat and rainbow trout, crappies, perch, and bullheads)-like shellfish, populations ave shown a seasonal and intermittent negative response in the reservoir. However,, coarse fish support a commercial fishery of considerable magnitude. In season, goose shooting is moderate-to-good in the upper third of the reservoir (geese like this type of habitat). Only occasionally is duck shooting fair, After drawdown, the fishing effort in the reservoir is nil but is moderate-to-heavy in the upper end of the "lake" and in the river. As for picnickers, they just don't enjoy themselves in a dust storm. This situation is not compatible with either a highly productive sport fishery with accompanying water and bankside uses, waterfowl, or even moderate upland and small game use. (There is public access along most of the lake, but it is difficult to get to the shoreline.)

Uses are the guidelines of this report; however, the following comments must be made regarding the wildlife resources. When the reservoir is full the water is cool and clear. The depth of light penetration is--let's say--20 feet (the photo zone). Maximum photosynthesis occurs in this prism of the lake regardless of whether the plants are planktonic, submerged, or semi-emergent (such as duckweed). Below this depth relatively no photosynthesis occurs and as a result no plants. The average depth

of the reservoir is 30 feet. When the depth of the reservoir is reduced 10 feet it is only natural to suppose that the rest of the bottom now would receive sufficient light for plants to grow, but this is usually not the case. Algae blooms and turbidity reduce light penetration to a few feet. Ducks are divided into two feeder types--dabblers and divers. Dabblers--such as mallards--inhabit the shallow areas and are partly submerged as they gobble up the ooze, snails and clams, worms, algae, and plants and seeds that are found usually under these natural conditions. Divers, on the other hand, feed along the bottom in water 6 to 20 feet deep and, with the exception of fish, eat the same foods that dabblers do. Sustained natural food production for waterfowl, upland game birds (burr weed, smartweed and duckweed), and sportfishes in this reservoir is nil. Agricultural crop depredation by some species is extremely likely.

Snake River Below American Falls
(S695 - S714)

Coarse fish production in this reach of the Snake River is extremely high. Carp and suckers to 10 pounds and chub to 4 pounds are relatively common. Bullheads are so numerous they are stunted. Rainbow trout--to at least 10 pounds--are the primary game fish species. The ratio of coarse to game fish is probably at least 1000:1. Limited spawning gravels of dubious quality require the game fishery to be maintained by hatchery plants. Area of bankside fishermen use is extremely limited; but use is heavy where it occurs. Fishermen use by boat is light. Crayfish and clams also inhabit the area, but in very small numbers. Other water-contact

uses such as boating, water skiing, picnicking, camping, and birdwatching, are nil. The Snake River in this stretch is--essentially--in a canyon, thus access is extremely limited. This does not subtract from its worth; indeed, could add to it for purposes such as boating, if it were not for the extensive beds of waterweed, pondweed, filamentous green algae, and duckweed and/or coontail. This stretch of the Snake River is a natural "Duck Heaven." A situation enhanced by the fact that--in addition to its limited access and isolation--it is adjacent to the Minidoka National Wildlife Refuge and a considerable acreage of croplands. Again, this area is a natural for ducks, but its use by geese is limited. The canyon is a series of pockets and constrictions which resemble a series of eggs strung on a piece of spaghetti. In pockets the channel is well defined by the lack of weeds, but the shoulders of the channel and the eddys are filled with extensive weed beds growing on the deposited silt. In the areas protected from wind and current green algae blooms were noted to be so heavy it appeared as if someone had poured green paint on the water surface. This is fine duck food, but a latent BOD load of significant proportions.

Small game, upland game, big game and stockwatering use is limited, but heavy where possible. Nutrient enrichment is also provided by irrigation return water. Many semi-pond type aquatic insects in good numbers are found in association with the weed beds.

During these observations the general color of the river was white-light grey. The general color of the water was milky. At this time the aesthetic value was extremely low. This is evidenced by the fact over 24 (by actual count) fishermen were overheard cursing the highly turbid

condition, and didn't even gear up to give it a try. The bullhead and carp fishermen used worms, dough balls, or salmon eggs for bait. Trout fishermen, for the most part, used artificial lures in addition to worms, but usually caught chub instead of trout. (On several occasions, a young fisherman with light tackle was observed tangling arm pits with a large --over 10 pounds--carp. Of course the carp won the contest, but that kid had enough adrenalin in his system to last a week.)

This highly turbid condition (maybe a couple of inches reading with a secchi disc)--the result of complete drawdown in American Falls Reservoir--started an approximately August 22, 1966, and prevailed throughout the survey period. Grousing fishermen said this situation happens annually, but that the time and length of occurrence vary.

Presently, the average aesthetic value of this reach in general is low, but the appearance of the area just below the dam for a distance of approximately one-half mile is so low it makes the Black Hole of Calcutta appear like a flower garden by comparison. Dying, dead, decaying fish of all species were noted piled on the bank, windrowed along the shore, or in free floating mats in the eddies. Blow flies were everywhere and on everything. The sewage treatment plant effluent added also to this deplorable situation. Sphaerotilus was very much in evidence, being particularly noticeable in the local park and recreational area, which includes a float (dock) and one of the few boat launching facilities.

Raft River
(S692 R 1.4)

This small stream flows through an over-grazed valley very similar in appearance to the Grand Coulee in the State of Washington. For the

period of these observations, it was essentially filled with dead tumbleweeds (blown in by the wind) and filamentous green algae.

Compared to the numbers and kinds of coarse fishes observed, the game fish (trout) population would be in a minute minority. The coarse fishes were mostly minnows, daces, suckers, and a few chub.

Cool water pond type insects were in abundant supply, both as to type and numbers, in association with the filamentous green algae masses. Snails were also present, but their numbers were relatively few. In the lower reach of the river stockwatering is the major use. More than two herds of over 200 cows were observed.

The river bed of the Raft River is composed of dirt, sand, and some gravel. The general color of the stream was green (from the algae) but the water itself was colorless. The aesthetic value of this reach of the stream is low because of the tumbleweeds.

Waterfowl use of the stream will be low but the use by upland and small game is very heavy. Included are rabbits, quail, pheasants, and doves. Big game (mule deer) use is light in this reach. All other uses, with the possible exception of irrigation, are either light or non-existent.

Ignoring the tumbleweeds, cow pies, and masses of algae for the moment, the clear gurgling water of the Raft was very pleasant to observe and hear in an area that has so much muddy, weed-choked water.

Snake River, Minidoka Dam to Burley
(S654 - S674.9)

Most of the fishes in this reach are coarse fish of many species. Trout, bass, catfish and perch are the primary sport fish, but many of these were found to be in relatively short supply. The artificial trout fishery, however, is good. Stream gradient is low and, as a result, the

river meanders slightly through this section. The banks and islands are well stabilized by luxuriant growths of bulrush, cattail, sedge, spike-rush horsetail, willow, cottonwood, burrweed, dock, etc. The bottom of the river is covered mostly by mud or mud (silt) and sand. Clean gravel bars were few in number and limited in size, thus spawning areas for game fish species are slight. In many respects this highly controlled section of the Snake River resembles a long, shallow, narrow lake filled to a significant degree with pondweeds, waterweed and, to a lesser extent, watermilfoil. Moderate types and numbers of pond types of aquatic insects were noted in association with the weedbeds; however, the snail, clam, and crayfish populations were very light. Bankside fishing was light and, with the exception of the State park, other water oriented recreational uses were either very light or non-existent. Use by waterfowl will be heavy in season as is use by upland and small game. No use by big game was observed. Stockwatering was very light, as was the amount of pumping directly from the river. Agricultural crops or scrub high desert type brush cover most of the land adjacent to the river.

The aesthetic value of some portions of this section are moderate at best; and, bankside deposits of trash, garbage, agricultural refuse, carbodies, broken cement products (Idaho Cement Products), and cement mixer washings reduce further the general appearance of the area.

The general color of the river was a light, muddy, diatom brown, but the water was slightly milky colored.

Main Drain (Rupert District)
(S642 MD 0.2 - 1.7)

Minnows, chubs and carp made up the bulk of the fish population. The pond type aquatic insect population was composed mostly of dragon

and damsel fly nymphs, with several types of beetles, diptera (fly) larvae, bloodworms, and one species of snail. Grass frogs in moderate abundance were also observed. A significant portion of the very soft mud bottom supported stands of either cattail or pondweeds with filamentous green and/or blue-green algae. The water was quite turbid from suspended solids and colored a tawny diatom brown. Free pondweeds were of sufficient magnitude to require two screens and one syphon (culvert) to be cleaned at least once a day. Extremely turbid irrigation return water was observed entering the canal at two locations. In general this is good habitat for dabbler type ducks and teal. The banks and immediately adjacent areas offer excellent upland and small game habitat. Two pumps for irrigation were observed and one stockwatering site was noted. The aesthetic value of the Main Drain Canal is slight, and it has no other potential uses.

Snake River, Milner Dam to Shoshone Falls Dam
(S615.01 - 640.0)

In this reach the Snake River, reduced to a trickle, flows through a basalt, often precipitous, canyon which frequently is hundreds of feet deep. Immediately below Milner Dam the water was relatively clear but slightly milky colored. At Murtaugh, the water was turbid and colored a clay tan brown. From Hansen downstream it was extremely turbid and colored brown. Diatoms were the most prevalent plant. Surprisingly, with the exception of "igloo" type caddis flies, most other typical forms of aquatic insects were well represented in moderate supply. Fingernail clams were found in the fine gravel sandy mud substrate, and the supply of snails was also moderate. Minnows and small chub were the dominant

fish forms; however, bankside evidence showed that sportfish species were present in discreet loads at least intermittently. Irrigation water cascading over the cliff as it was returned to the river was frequently observed. With the exception of use by reptiles--lizards and snakes--wildlife use of the area is non-existent because of isolation and desolation. Although awe-inspiring, the aesthetic value of this dark, sunbaked, colorless canyon is less than if there was sufficient river flow to provide spray and roar from the Cascades and rapids.

Rock Creek Below Twin Falls
(S606.8 RC 8.2)

This creek supports a moderate population of native coarse fish species--mostly minnows, daces, and chub. Tourist small trout are known to infrequently inhabit this reach. Juvenile "Huck Finns" use the area lightly to moderately. Small and upland game use is moderate; but other uses, including waterfowl, are light.

This creek flows through a trash dump area, past a typical cement and gravel operation, through a wrecking yard, and on down the valley. Access is very limited. The creek bottom was largely covered by mud, but a few rocks and some exposed gravel beds were found. Pondweeds and diatoms were found growing profusely where bottom characteristics allowed. The creek was turbid and had the color of olive brown. The water color was a light, milky tan.

Salmon Falls Creek
(S586.7 SF 0.6)

Carp and suckers were noted to be the most common fishes. Minnows were also noted in moderate abundance, but only three trout were observed. Crappie and perch are also found. Pondweeds were very abundant; and in

association with green algae, a good, diverse insect population was noted. The creek was full of sport and coarse fish food. A black carp--probably blind--was observed feeding on the snails and insects in the pondweed masses. The general color of the stream was slightly milky but the water was colorless. The bottom was covered by some small rocks, but mostly by pebbles in association with sandy clay mud.

A significant portion of the stream contained tumble weeds which had been blown in by the wind.

A mineral spring Spa was noted in the vicinity. Taking this into consideration, horseback riding up the valley is a bankside use not often taken into account. These uses, and stockwatering, was moderate, all other uses are either light or non-existent. The major use of this stream is irrigation.

Snake River - Hagerman
(S582.5 - S584.4)

Although in this general area of the Snake more trout are produced commercially per acre-feet of water than anywhere else in the world, the river itself is a mud hole and its primary use is waste transport. The paramount fringe benefit of this area is its heavy use by waterfowl; however, the artificial trout fishery is good.

The flow of the river is extremely regulated, which causes all impoundments to function as catch and settling (desilting) basins. The river banks are well stabilized and controlled by mostly sedge and bulrushes. The channel is covered by rock, gravel, and sand; most of the bottom, however, is covered with various kinds of silt. These lightweight forms of sediments support luxuriant growths of waterweed, pondweeds, coontail and smartweeds. Duckweed was ever present in eddies and

wind-protected areas. Carp and sucker feeding activities caused a roilled water, a condition that is not conducive to sportfish production. In addition, colloidal clay particles from return water caused sufficient turbidity to reduce the secchi disc reading to about 4 feet and maximum light penetration to about 6 feet. Coarse fish species observed include carp, suckers, chub, minnows and daces. Sportfish species include trout (two nice size rainbow were observed--dead) white sturgeon, and species of spiny rays (bass, bluegill, crappie and catfish). If the aesthetic values of the "1,000 springs" and waterfowl population are ignored, the aesthetic value of this reach approaches zero when the water is muddy. With the exception of waterfowl use, which will be heavy and upland and small game use, which is moderate, other uses are either light or non-existent. Bankside fishermen use is moderate and fishermen use by boat is also moderate. Because of the bird refuge in the immediate vicinity, bird watching use will be moderate and so also was stockwatering when possible. Three fishing boats were observed and six others were heard using this reach. There were two public and two private launching facilities. Most of the natural clam and mussel populations has disappeared because of suffocation. Diatoms and unicellular green algae were also found to be in moderate supply.

The general color of the stream in this reach was a greenish tan diatom brown. The lightweight colloidal clay caused the color of the water to be milky.

Snake River, Marsing to Adrian
(S424.0 - S402)

The river meanders with reasonably good flow through this stretch, with the banks well stabilized by growths of cattail, sedge, bulrush, and/or grass. The bottom in the main stem is covered by gravel, sand,

and/or sand and mud, and in the back waters is covered by sand and other various kinds of silt. The higher the velocity the larger--and heavier--were the particle sizes of the sediments. Trout, bass--two kinds, channel catfish, crappie, bluegill, bullhead, and sturgeon are the sportfishes found in this sector. Coarse fish species included carp, suckers, chub, minnows, daces, and squaw fish. In general, the spawning areas for sportfish are adequate.

The general color of the river was a dark green diatom brown. Diatoms and unicellular green algae were the most abundant plants. The color of the water was excellent and practically clear. Aquatic insects were in good supply, and the population was moderately diverse. An occasional turbid streak from irrigation return water (west bank at Marsing) was noted; however, because of the dilution factor, it did not last a great distance. Pondweeds and waterweed were observed mostly in the backwaters and slough areas. Fishing use, either from bankside or by boat was moderate. Other bankside and recreational uses such as picnicking and waterskiing was light. Small and upland game use of the area is heavy; however, the use by big game is very light. Use by waterfowl, especially ducks, will be heavy in season. Shellfish populations are species included in the fishes' food chain--small clams, snails, and crayfish in relatively small numbers. Most of the water for irrigation was from canals, but stockwatering was common. Keeping the thought in mind that the aesthetics of this reach shouldn't be compared with either the situations noted at St. Anthony or Burley, the aesthetic value of this area is high. Although

there are no formal parks or picnic areas developed--as such--access is good. In general this reach receives light use by picnickers, waterskiers, and bird watchers, but is rather heavily utilized by sportsmen.

Jump Creek (S418.2)

This creek was turbid and milky colored. The bottom was covered by fine gravel, clay and silt. The general appearance of the stream indicated that flow is intermittent, and was composed in large measure of irrigation return water much of the time.

Sucker Creek (411.8 SC 0.8)

The water in this fast flowing but meandering creek was clear. The banks were well stabilized, covered with grass, and the bottom covered by small rocks and pebbles (truly a pleasant sight after observing the Malheur and Owyhee). At the time these observations were made, stockwatering and upland and small game uses were heavy.

Owyhee River Near Adrian
(S392.3 02.9)

This stream in this reach is very slow moving, very turbid, and colored a tawny diatom tan. Carp and suckers were the most abundant species of fish, and their feeding activities caused very roilly conditions in the water. The stream bottom was covered mostly by a very fine--lightweight--silt. Pondweeds, waterweed, and coontail were noted growing--but not too profusely--in areas with a firm mud bottom. Various types of diptera larvae were the only insects found.

Small and upland game use is heavy, waterfowl use will be moderate; and with the exceptions of stockwatering and irrigation, other uses are nil.

Briefly, the stream in this stretch is unsightly, has limited use, and essentially no potential.

Boise River - Parma
(S391.3 B 5.0)

In this stretch the highly controlled Boise River was sandy and turbid. Various sized masses of pondweeds and coontail in association with filamentous green and blue-green algae noted in the current. The very silty, musty odored bottom--where the sediments were firm--supported stands of waterweed, pondweeds, coontail and some smartweed in association mostly by "ooze type" silt.

Coarse fishes--mostly carp--are the most abundant; however, an occasional trout, and bass, catfish, perch, crappie and whitefish support a moderate sport fishery. Small and upland game use is heavy and waterfowl (ducks) use will be moderate. With the exception of transport for wastes--both industrial and agricultural--other uses are nil.

Malheur River
(S368.5 MO.4)

This turbid, highly colored stream supports an abundant carp and sucker population. There was a small amount of filamentous green algae found along the banks near the surface of the water. Diatoms were the most abundant plants. The bottom was covered mostly with a fine mud and ooze. A few gravel and sand bars were kept clean by the current. Septic conditions were noted in sediment more than an inch deep.

The major use of this stream is for irrigation water, both for waste transport and supply. Small and upland game use was heavy, waterfowl use for resting moderate, and stockwatering light. Within reason, no other uses exist. This stream is used essentially for irrigation, and any other use--regardless of its magnitude--is accidental and coincidental.

Payette River
(S365.6 P 2.1 - P 4 1)

The major portion of the fish population in this--or any stretch of the Payette River below Black Canyon Reservoir--reach is coarse fish types. A moderate sport fishery is supported by channel catfish, bullheads, bass, crappie, perch, and a few trout. Access to the river is moderate, and a "hurry and wait" sport fishery exists. (Hurry to get there and wait until a fish bites.) Bankside fisherman use is moderate also. Spawning areas for the fish species present are adequate. In the winter time there is also an under-used whitefish fishery (like the Yakima River). Other water-contact recreational uses are nil. This stream is used primarily for the transport and assimilation of wastes. Among these wastes are included discharged materials from slaughterhouses, feedlots, and irrigated fields. Small and upland game use was heavy. Waterfowl use (resting) will be moderate and big game use is non-existent. Stockwatering--other than feedlot--use was light (the family cow, for example).

Juveniles were observed fishing and beachcombing in the effluent from the Wells-Davies slaughterhouse. The malpractice of discharging untreated slaughterhouse wastes should be stopped immediately in the public interest. Cows, hogs, and sheep are natural vectors or intermediate hosts for human parasites. A few of these are as follows:

PARASITE	HOST	FORM	SOURCE
Giant Roundworm	hogs	eggs	fecal
Small Tapeworm	sheep	eggs	fecal
	cattle		
	hogs		
Beef Tapeworm	cattle	eggs	fecal
Pork Tapeworm	hogs	eggs	fecal
Rabbit Fever	mammals	cells	blood
Brucellosis (Undulant Fever)	cattle	cells	blood
	hogs		secretions and excretions
	sheep		

These parasites are discharged with certain slaughterhouse wastes and a person in contact with the receiving water would be unduly exposed.

Bottom sediments are gravel and sandy mud. The bulk of the aquatic vegetation was pondweeds in association with filamentous green algae; and the aquatic insect population was small and not very diverse. Snails or clams were not found.

The general color of the stream was light, milky, olive tan, and the aesthetic value is no more than moderate. This reach of the stream has been a "catfish hole" for a long period of time.

Lower Payette Canal, Highway 30 N-95 Bridge

A very turbid highly colored condition characterized the irrigation return water in this canal. Poor--if not improper--irrigating practices wash a tremendous amount of silt (topsoil) into this canal, which in turn discharges its silt load into the Snake River. A similar situation was observed also just north of Ontario, Oregon, on Highway 201. In the latter area, beets, corn, and onions were the principal crops. (On reflection,

the irrigation return water from fields of these crops was infinitely muddier than it was from potato, hay or grain fields.) Water pollution from irrigation return water is oftentimes much more damaging and far reaching than some of the other sources receiving our attention.

Weiser River at Weiser
(S351.8 WO.8)

All types and kinds of fishes (except sturgeon) are intermittently found in this reach, but catfish, perch, bullheads, crappie and bass dominate the moderate sport fishery. The usual supply of coarse fishes was also noted. The water in this section was very turbid and colored a whitish green tan. Suspended soil particles and colloids reduced sunlight penetration to a few inches. All the aquatic vegetation observed was of the emergent type; and no submerged aquatics could be found. Most of the bottom was covered by mud and/or very fine silt (almost like talc). Juveniles were observed bank fishing with "stink baits" at three different locations. This bankside use is moderate and so is use by upland and small game; with the exception of waste (including irrigation water) assimilation, other uses would be either very light or non-existent.

Snake River - Weiser
(S351.2)

The river in this section is a good habitat for most non-salmonid species of fishes. Sturgeon fishing is important in this reach. The river bottom on the north side was covered by a combination of mud and gravel. The bottom on the south side was covered by mud and very fine silt. Filamentous green algae and diatoms were noted growing on the north side; but only a sparse population of diatoms was observed on the south side. The bottom sediments stunk, and were colored black underneath the surface on the south side.

The general color of the river was a muddy, olive brown. The color of the water was a milky, olive tan.

Both types of fishermen use are heavy, as are other water-oriented recreational uses. (There are two well-developed recreational sites in the area.) Upland and small game and waterfowl use is moderate. Big game use is very light.

This reach is at the head of Brownlee Pool. The recreational and aesthetic values will vary with the pool elevation.

Brownlee Reservoir
(S285 - S351)

This 15,000 SA single-purpose reservoir extends from the upper end of Hells Canyon to Weiser, Idaho. Excellent fishing for large and small mouth bass, crappie, perch, flathead catfish, catfish, and sturgeon is found in the upper (relatively shallow) end of the reservoir and excellent bass and panfish fishing is found throughout the remainder of the pool. Frequently good trout fishing is enjoyed also. There are five well-developed recreational areas on the reservoir. Farewell Bend is located at the upper end on the Oregon side. The Olds Ferry site is on the Idaho side, west of Weiser. The two BLM recreational sites (Steck and Beggs) are on the Idaho side of the reservoir west of Cambridge, and Brownlee Camp is found at the mouth of Brownlee Creek, also west of Cambridge. Fishing and other recreational uses of the remaining portion of the reservoir in season is moderate. Waterfowl use is heavy and upland and small game and big game use is moderate-to-heavy.

The general color of the reservoir was an olive green brown. However, in the pockets, small bays, and hole-in-the-wall type situation the color of water was bright green from the algae blooms. The bloom was so thick that many of these coves appeared as if the water surface had been covered with bright green paint. Oftentimes the algae had been windrowed on the beach. In the main body of the reservoir, this situation did not occur because of the mixing action of the wind. It should be noted, however, the concentration of algae cells was present. During and from "die off" the BOD of this bloom could cause an appreciable oxygen sag at depth in the reservoir. Under this condition, quality of the water passed downstream would be greatly impaired. Changes in the pH, CO_2, and ammonia concentration would also occur.

Brownlee to Oxbow
(S273 - S285)

Coarse fish species--mainly carp--dominate this highly fluctuating reach of the Snake River. The naturally produced salmonid population is essentially nil. Idaho Power and Light maintains a rainbow trout sport fishery with moonlight plants, but this is only an attempt to obtain the goodwill of the public. Bass, crappie, and catfish are also found in the reservoir but fisherman use is only moderate--at best--even though bankside access and boat launching facilities are excellent.

The bottom is covered by boulders, rocks, gravel and sand which support good growths of unicellular algae and diatoms. Extensive beds of mussels and clams are to be found in the gravel-sand areas. Submerged or typical emergent aquatic vegatation was conspicious by its absence. A moderate planktonic algae bloom was noted; however, since the exchange rate of the reservoir is high, this bloom probably originated in Brownlee.

Other water-contact sport is light, but small and upland game, waterfowl and big game uses are heavy. Stockwatering use (pasture) is moderate. Other uses are either extremely light or non-existent.

The aesthetic value of this reach is highly variable, depending upon the individual. As a wild area, its value is moderate.

This single-purpose reservoir exists and is used strictly for power production. Any other uses, this reservoir may have are strictly accidental and coincidental. A valuable sport fishery could be maintained with the proper attitude and application of correct management techniques.

Snake River Below Oxbow
(S266 - S273)

Coarse fishes dominate the fishery in this reach. With the exception of whitefish, all fish species mentioned for Brownlee and Oxbow are present. The sport fishery is supported mostly by cool-to-warm water types. This stretch of the river is a series of rapids, riffles, and pools. The rock covered bottom was either bare (mostly) or covered by encrusting green algae and diatoms and sand. NOTE: Very little filamentous green algae was observed--all unicellular.

Extensive clam and/or mussel beds were noted in riffle areas. The present stable river banks are covered by bare basalt rocks and boulders. There undoubtedly will be some readjustment after Hells Canyon Reservoir is filled. Present spawning areas are sufficient. The fluctuation of the river's flow is inimical to sport fish and enhances the coarse fish species.

Thirty-three "sawbills" feeding in the pools of this reach show the large population of small fish supported in this area. Waterfowl use--especially by divers--will be heavy and dabbler use will be at least light (food shortage). The use by upland, small and big game is heavy.

The general color of the river was light diatom brown-green. The water was colorless and the aesthetic value of the river in this reach is high.

The same general statements can be made about the entire Hells Canyon reach of the Snake River--all the way to the mouth of the Clearwater.

The present salmon run restoration project concerning Oxbow is a hoodwinking, public relations stunt, and a waste of time, money, and especially salmon.

Snake River
(S0.0 to S139.3)

Fish species which support an excellent sport fishery include chinook salmon (three races) coho and sockeye salmon, steelhead trout (two races) white and green sturgeon, large and small mouth bass, channel and flathead catfish, perch, crappie, bullheads, and bluegills and other pan fishes. The insect population is abundant and diverse. The shellfish population, moderate in numbers, includes crayfish, snails, clams and mussels. The use of this area by waterfowl is heavy, with considerable nesting done in localities. The big game use of the area is moderate and so is the upland and small game use except in the many locales where the use is heavy (small game abound along the "Breaks of the Snake").

The use of this reach for recreational purposes, both waterborne and bankside, varies from moderate in the upper part to heavy in the lower part and is to some extent dependent upon access, streamflow, and season.

Throughout the area stockwatering is moderate; and in the upper portion of the reach, feedlot and holding-pen use is moderately heavy.

With the exception of a few areas--air pollution at Lewiston, Clearwater River filled with over a year's supply of logs, foam and brown streak from PFI in the Snake, blood and paunch discharged just below the Interstate Bridge, and manure from feedlots and holding pens--the aesthetics of this reach are high. At least two-thirds of this stretch is wild area. There are very few parks on other developed recreational sites, but most of the area is either in the public domain or is open for public use. This area also contains a large waterfowl refuge. Access is limited although the viewpoints, are many.

Irrigation water is obtained by pump throughout the region and also by canal on the south side in the lower third portion; but this use is relatively light.

The use of the Snake River for waste assimilation and navigation presently is moderate, but for hydro-power is heavy.

In a nutshell, all uses are either moderate or heavy with the exceptions of water supply and irrigation.

V SUMMARY

In summary, the Snake River above Idaho Falls is a well-used but not mis-used multipurpose stream. From Idaho Falls to American Falls it loses many of its non-money making uses and becomes a single-purpose river.

The cold water fishery and other recreational uses are accidental, intermittent and in a state of continual change. From American Falls to Marsing the river has only three efficient uses; i.e., irrigation, power production, and waterfowl habitat. These are compatibly scheduled or are not affected. Coarse fish species dominate the population both as to kinds and numbers. From Marsing to Hells Canyon, other uses are now noted and the moderate-to-heavy fisheries use is of the warmer (cool, not cold) water type.

From Hells Canyon to the mouth, the cool water fishery is still found in moderate proportions but the most important fisheries are migratory--salmonid and sturgeon. In general, from the mouth of the Salmon River to the mouth of the Snake River, most uses are moderate-to-heavy, integrated, and much more compatible than many people would suspect.

In general, the salmonid fisheries can be enhanced several orders of magnitude with proper management. This includes the introduction of an exotic species of fish into the system. This fish (or fishes) would serve two important purposes. The first--but not necessarily the most important--would be as a natural food and buffer between all of the species in residence and the downstream migrant fry and fingerlings. The second function would be as a forage fish for all species that presently inhabit the area. This would add to size of sport fish which in turn would induce fisherman harvest more of them. This (or these) exotics should be of small size, planktivorous, PELAGIC, and have a high reproductive rate. The great lakes smelt, "white baits," or threadfin shad are examples.

With the exception of a few areas--Milner to Twin Falls, as example--fish production could be increased manyfold by proper, scientific management. In many regards the Idaho, Oregon, and Washington Departments of Game are as much to blame for missed opportunities as are the power companies and irrigation districts for single-purpose management.

The waste loads allowed (assimilation capacity) should only infrequently exceed approximately ten percent of the streams' capacity as presently measured. Waste loads and a stream can be likened to a person. Even with a headache a person is sick. With a headache and a cold--a person is a little more sick. Each waste load should be considered as a tumor on a vital organ. How many does it take for how long before death occurs? Obviously, just one--providing it is either big enough or in the right spot.

Similarly, the same thing can be said concerning the fisheries agencies. It's about time they quit playing ostrich, carping to their public with excuses, and initiate a positive, objective plan. They just will not accept the fact that many great changes have been made--due to progress and the activities of man. Society and technology are now in the jet age. In many respects, natural resource agencies are still "Rickshaw Charlies."